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CLINICAL REPORT

Oral Rehabilitation of a Young Adult with Amelogenesis Imperfecta: A Clinical Report

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Abstract This clinical report describes a multidisciplinary approach for the oral rehabilitation of a young adult patient diagnosed with hypoplastic amelogenesis imperfecta with a skeletal Class III malocclusion. The specific objectives of this treatment were to eliminate tooth sensitivity while enhancing esthetics and restoring masticatory function. The reverse horizontal overlap of posterior teeth was maintained. Treatment included removal of few teeth, lengthening of the maxillary and mandibular clinical crowns, and placement of anterior and posterior metal-ceramic fixed partial dentures. The third month recall examination revealed no pathology associated with the rehabilitation, and the patient's esthetic and functional expectations were satisfied.

Keywords Amelogenesis imperfecta · Hypoplastic · Full mouth rehabilitation

Introduction

Amelogenesis imperfecta has been described as a complex group of inherited conditions that disturbs the developing enamel structure and exists independent of any related systemic disorder [1–3]. This enamel anomaly affects both the primary and permanent dentition [1–4]. This is entirely ectodermal, since mesodermal component of the teeth are basically normal. Amelogenesis imperfecta trait can be transmitted by either autosomal dominant, autosomal recessive or X-linked mode of inheritance [5]. The other causes of amelogenesis imperfecta include febrile illness or vitamin deficiency, local infection or trauma, fluoride ingestion, congenital syphilis, birth injury, premature birth or idiopathic factors [6].

The incidence of amelogenesis imperfecta has been reported to vary between approximately 1:700 and 1:16,000, depending on the population studied and the diagnostic criteria used [4, 7–9]. Although amelogenesis imperfecta has been categorized into four broad groups primarily based on phenotype—hypoplastic, hypocalcified, hypomaturation, and hypomaturation-hypoplastic—at least 15 subtypes of amelogenesis imperfecta exist when phenotype and mode of inheritance are considered [1–4, 10–12]. According to the literature, amelogenesis imperfecta patients, regardless of subtype, have similar oral complications: abnormal formation of the enamel, teeth with abnormal colour: yellow, brown or grey, higher risk for dental caries, teeth sensitivity, poor dental esthetics, and decreased occlusal vertical dimension [13, 14]. Other dental anomalies associated with amelogenesis imperfecta include, multiple impacted teeth, congenitally missing teeth, open occlusal relationship, and taurodontism [4, 12, 15].

Restoration of these defects is important not only because of esthetic and functional concerns, but also because there may be a positive psychological impact for the patient. Treatment planning for patients with amelogenesis imperfecta is related to many factors: the age and socioeconomic status of the patient, the type and severity of the disorder, and the intraoral situation at the time the treatment is planned. Several reports have described an unusual malocclusion occurring in some patients with amelogenesis imperfect [16]. This clinical report describes

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the sequenced treatment for a young adult patient with hypoplastic amelogenesis imperfecta with a Class III malocclusion using Pankey Mann Schuyler's philosophy for full mouth rehabilitation. The anterior cross-bite was corrected whereas the posterior reverse horizontal overlap was maintained.

Clinical Report

A 19-year-old girl previously diagnosed with hypoplastic amelogenesis imperfecta presented for treatment in the out patient department of Prosthodontics at A. J. Institute of Dental Sciences, Mangalore. Primary concerns included extreme tooth sensitivity, dissatisfaction with the size, shape, and shade of her teeth, food accumulation, bad odour and poor masticatory efficiency. A detailed medical, dental, and social history did not reveal any contraindications to dental therapy. Clinical and radiographic examination of the patient revealed carious lesions with 35, 37 and 47, generalized mild attrition, generalized tooth hypersensitivity, short clinical crowns, multiple spacing between teeth, Angle's Class III skeletal relationship and reverse horizontal overlap of several anterior and posterior teeth (Fig. 1). The centric occlusion position was found to be coincident with the maximum intercuspal position and no increase of vertical dimension was required.

Maxillary and mandibular complete-arch impressions were made using alginate, an irreversible hydrocolloid impression material (Tropicalgin). Diagnostic casts were fabricated from Type III dental stone and mounted on a semi-adjustable articulator (Girrbach Corp) (Fig. 2) using a face-bow transfer (Quick Mount Face-Bow; Girrbach Corp) (Fig. 3) and a centric relation record (bite registration wax Aluwax).The articulator was programmed using protrusive records. Occlusal scheme was developed using a customized Broadrick's occlusal plane analyzer (Fig. 4) and a diagnostic wax up was done. The incisal guidance was determined with the diagnostic wax-up (Fig. 5) and the incisal guide table was customized with self cure acrylic resin. The anterior cross-bite was corrected whereas the posterior cross-bite was maintained. A putty index of this wax up was fabricated which was used for the fabrication of the temporary as well as permanent restorations (Fig. 6). Pre operative OPG (Fig. 7) was taken and the treatment plan was developed which included preliminary periodontal treatment i.e. scaling and root planing followed by

Fig. 1 Intraoral view

Fig. 2 Diagnostic casts mounted on a semi adjustable articulator with diagnostic wax up

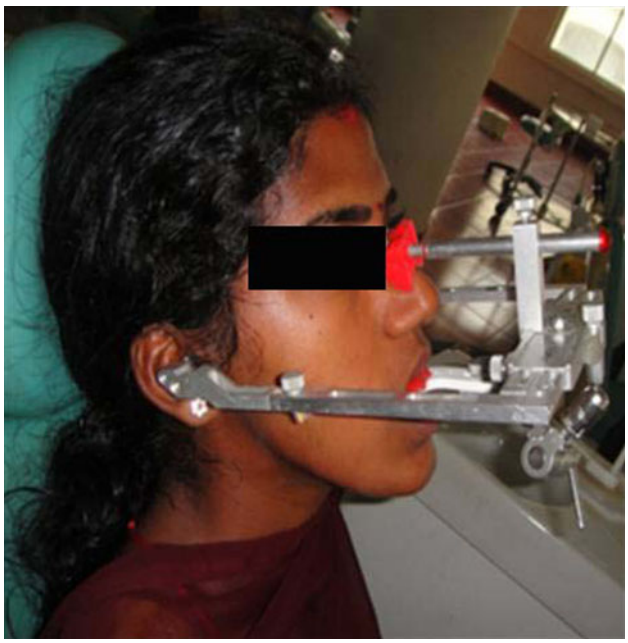

Fig. 3 Facebow transfer

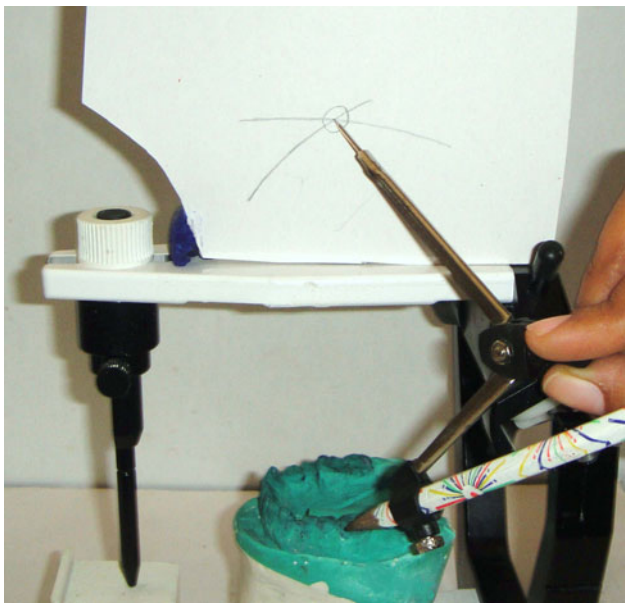

Fig. 4 Customized Broadrick's occlusal plane analyzer

Fig. 5 Diagnostic wax up

Fig. 6 Putty indices

extraction of third molars, pulp space therapy, crown lengthening procedure and full mouth rehabilitation using Pankey Mann Schuyler's philosophy [17] and metal ceramic crowns for all teeth.

Although a plan of orthognathic surgery followed by orthodontic therapy was presented to the patient as part of the primary treatment option, the patient declined these

Fig. 7 Pre operative OPG

Fig. 8 After crown lengthening procedure of 14, 15, 16

treatment modalities due to the financial burden. Following a dental prophylaxis and oral hygiene instructions, the patient was placed on a 0.12% chlorhexidine gluconate oral rinse, with a recommended use of twice daily. Extraction of 18, 28, 38 and 48 was carried out. Pulp space therapy of carious teeth was done in relation to 35, 37 and 47 Intentional pulp space therapy was performed in relation to 13,14,16,17, 24, 25, 27, 34, 36, 44, 45, 46, as the clinical crown length was reduced and this would lead to pulp exposure during tooth preparation for the placement of final restoration. In addition, a stent was fabricated to mark the amount of crown lengthening required and the crown lengthening procedure was carried out for 14, 15, 16, 17, 24, 25, 26, 27, 34, 25, 36, 37, 44, 45, 46 and 47 by raising a flap and allowed to heal for 2 weeks (Fig. 8).

Mandibular anterior teeth were prepared for metal-ceramic restorations (Fig. 9). Provisional restorations were fabricated with tooth coloured self cure acrylic resin (DPI) (Fig. 10) using the putty index. They were cemented with zinc-oxide eugenol (Temp-Bond; Kerr Corp). Definitive impressions of the prepared mandibular anterior teeth were obtained using vinyl polysiloxane impression material (Aquasil soft putty and light body, Dentsply). The

Fig. 9 Tooth preparation of mandibular anteriors

Fig. 10 Temporary crowns on mandibular anteriors

Fig. 11 Tooth preparation of maxillary anteriors

Fig. 12 Temporary crowns on maxillary anteriors

mandibular diagnostic cast was demounted. A working cast was generated from Type IV die stone and mounted onto the articulator using interocclusal records (Aluwax) against the maxillary cast. Two anterior 3-unit metal ceramic fixed partial dentures were fabricated and evaluated intraorally, adjusted, and cemented (Fuji Type II Glass Ionomer Cement). Maxillary anteriors were prepared (Fig. 11) and provisional restorations were fabricated (Fig. 12). Maxillary and mandibular definitive impressions were made using vinyl polysiloxane impression material (Aquasil soft putty and light body Dentsply). Facebow transfer was done and the casts were mounted on the same articulator with the customized incisal guide table. Metal ceramic fixed partial dentures were fabricated and evaluated intraorally, adjusted, and cemented (Fuji Type II Glass Ionomer Cement).

Next the mandibular posterior teeth were prepared and restored with full metal fixed partial dentures with ceramic facing for 34, 35, 36, 44, 45 and 46 and full metal on 37 and 47 (Fig. 13). The maxillary posterior teeth were prepared. A facebow transfer was done after the definitive impression of the prepared maxillary posterior teeth. Full metal fixed partial dentures with ceramic facing were fabricated for 14, 15, 24 and 25 and full metal restoration on 16, 26, 17 and 27. They were evaluated intraorally, adjusted, and cemented with glass-ionomer cement (Fuji II) (Fig. 14).

In addition to oral hygiene instructions, the patient was prescribed a topical 1.1% neutral sodium fluoride with recommended daily use. Recall evaluations were done regularly, at an interval of 1-month each for 3 months, and

Fig. 13 Metal ceramic restorations of mandibular teeth

Fig. 14 Metal ceramic restorations of maxillary teeth

the patient did not experience tooth sensitivity or any other complication associated with the oral rehabilitation. The patient's esthetic and functional expectations were also satisfied (Figs. 15, 16).

Discussion

Management of amelogenesis imperfecta in the young adult using fixed prosthodontics is not a novel approach, but is possibly an underutilized one [18]. The fixed prosthodontic treatment selected, albeit invasive, is more conservative than other considered alternatives. Other treatment methods involving extractions of remaining teeth and placement of removable prostheses or extractions of remaining teeth combined with implant- supported fixed or removable prosthodontics are considerably more radical and have greater incidence of clinical complications than conventional fixed and removable prosthodontics [19, 20]. The patient wished to retain as much of her natural

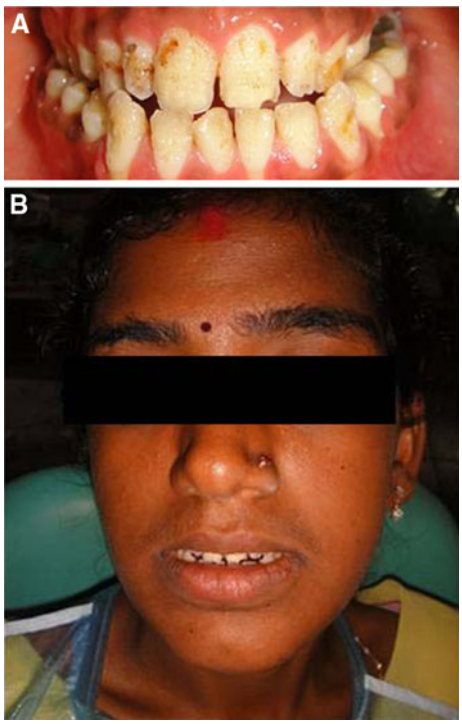

Fig. 15 **a** Intra-oral Preoperative photograph. **b** Pre-operative photograph

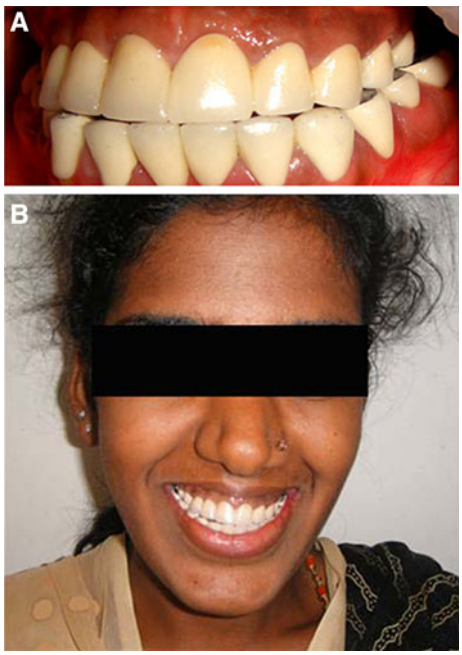

Fig. 16 **a** Intra-oral Post-operative photograph. **b** Post-operative photograph

dentition as possible. This option, however, requires the patient to maintain meticulous oral hygiene since caries of abutments is the leading complication of FPDs supported by the natural dentition [21]. Pankey Mann Schuyler's philosophy of full mouth rehabilitation was used for the restoration of all teeth [17]. The anterior guidance was established with the diagnostic wax up and it was incorporated in the temporary restorations. The patient was comfortable with the temporary restorations and the final restorations were also fabricated using the same putty indices. However the disadvantage was that the facebow transfer had to be repeated at every step. The option of using porcelain laminate veneers for anterior teeth was eliminated as increased tooth sensitivity was one of the patient's primary concern.

Summary

This clinical report described the oral rehabilitation of a young adult patient affected by hypoplastic amelogenesis imperfecta. A plan to improve maxillary anterior alignment was accomplished without surgical or orthodontic intervention. After lengthening the clinical crowns of the posterior teeth, the rehabilitation included multiple anterior and posterior metal-ceramic fixed partial dentures to eliminate tooth sensitivity, improve esthetics, and restore function.

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